REMARKS

I. INTRODUCTION

The Office Action mailed on January 25, 2007 and the references cited therein have been carefully studied and, in view of the foregoing amendments and the following remarks, reconsideration and allowance of this application are most respectfully requested.

Claims 18-37 are currently pending. The Examiner has rejected claim 25 under 35 U.S.C. §112, and has rejected claims 18-37 under 35 U.S.C. §103 and for double patenting. Applicants have amended herein claim 25. Applicants respectfully submit that the pending claims are in condition for allowance.

II. REJECTIONS UNDER 35 U.S.C. § 112

The Examiner has rejected claim 25 under 35 U.S.C. §112 as failing to meet the written description requirement. Applicants have herein amended claim 25 and respectfully submit that claim 25 is in compliance with the written description requirement of section 112.

III. REJECTIONS UNDER 35 U.S.C. § 103

The Examiner has rejected claims 18-37 under 35 U.S.C. §103(a) as being unpatentable over Forrest et al. (WO 00/11725) in view of certain additional references. The references cited by the Examiner in combination with Forrest et al. are Sato et al. (U.S. Patent 4,479,028) and Hanak et al. (U.S. Patent 4,316,049) (claims 18, 19, 22-25, and 29); Sato et al., Hanak et al. and Peumans et al. (Applied Physics Letters, vol. 76(19), pp. 2650-2652, May 8, 2000) (claims 20 and 21); Sato et al., Hanak et al. and Pettersson et al. (Journal of Applied Physics, vol. 86(1), pp. 487-496, July 1, 1999) (claims 27 and 28); Sato et al., Hanak et al. and Lewis (U.S. Patent 4,771,321) (claims 18, 19, 22-26, 29, 30, 33 and 37); Sato et al.,

Hanak et al., Lewis, and Peumans et al. (claims 20, 21, 31 and 32); Sato et al., Hanak et al., Lewis, and Pettersson et al. (claims 27, 28, 35, and 36); and Sato et al., Hanak et al., Lewis, and Aratani et al. (U.S. Patent 5,854,139)(claim 34). It is respectfully submitted that these rejections should be withdrawn for at least the following reasons.

To render a claim obvious, the prior art must teach or suggest all of the claim limitations. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). Moreover, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion or motivation to do so. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the modification must be found in the prior art and not in the Applicants' disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

The primary reference asserted by the Examiner is Forrest et al. The Examiner alleges that Forrest et al. discloses an electron-hole recombination zone. Applicants respectfully submit that Forrest et al do not teach or suggest the presently claimed electron-hole recombination zone. Rather, Forest et al. teach away from the use of such a zone. As discussed in greater detail below, Forrest et al. teach the use of charge transfer layer. The express purpose for a charge transfer layer is to transfer charges (i.e., electrons or holes) to the adjacent subcell. The purpose of the charge transfer layer is consistent with the layers thickness of over 1000 Angstroms. This is distinct from the present electron-hole recombination zone, which facilitates the recombination of charges, rather than permitting the charges to pass to the adjacent subcell.

In the optoelectronic devices of the present invention, the individual subcells (which are each comprised of an electron donor layer and an electron acceptor layer) are

separated by an electron-hole recombination zone which serves to prevent the formation of a reverse heterojunction between adjacent subcells by facilitating the recombination of opposite charges. The effective electron-hole recombination that occurs at the electron-hole recombination zone prevents charge accumulation at the interface between adjacent subcells. Thus, the electron-hole recombination zone(s) is distinct from charge transfer layers, which allow charge carriers to pass from one subsection of a device to another, without recombination with a charge carrier of the opposite sign.

In characterizing Forrest et al., the Examiner refers to the disclosed devices as having "a composite charge transfer layer located between the subcells." Office Action at page 4. Forrest et al. states that a charge transfer layer "only delivers charge carriers from one subsection of an optoelectronic device to the adjacent subsection," in contrast to recombination of charge carriers of opposite sign. (Forrest et al., Page 7, lines 8-11). Moreover, the charge transfer layer to which the Examiner refers are a composite of semitransparent metallic layers that are "placed below or adjacent to [ITO] layers 8D10, 8D11, and 8D12 to form metallic/non metallic composite" layers having a combined thickness of over 1000 Å. (Forrest et al., Page 36, lines 5-8). The ITO portion of the charge transfer layer is specified as having a thickness of about 1000-4000 Å, combined with the 100 Å metallic layer to form the composite layer. (Forrest et al., Page 35, line 29 to Page 36 line 8). The instant electron-hole recombination zone of claim 1 has a thickness that is less than 20 Å. Due to the high thickness of the charge transfer layers disclosed in Forrest '725, they can function merely to transfer the electrons or holes to the adjacent section, rather than providing a zone for recombination of the charges. Applicants respectfully submit that Forrest et al. do not teach or suggest an electron-hole recombination zone having a thickness of less than about 20 Å.

Sato et al. does not cure the deficiencies of Forrest et al. Sato et al. does not teach or suggest organic photosensitive optoelectronic devices comprising multiple stacked subcells in series, wherein each adjacent subcell is separated by an electron-hole recombination zone. Sato et al. is directed to inorganic amorphous silicon-based devices rather than the organic devices of the present invention. Further, Sato et al. does not teach or suggest the use of the instant electron-hole recombination zone.

Hanak et al. also does not cure the deficiencies of Forrest et al. Hanak et al. does not teach or suggest organic photosensitive optoelectronic devices comprising multiple stacked subcells in series, wherein each adjacent subcell is separated by an electron-hole recombination zone. Hanak et al. is directed to inorganic amorphous silicon-based devices rather than the organic devices of the present invention. Further, Hanak et al. does not teach or suggest the use of the instant electron-hole recombination zone in an organic photosensitive optoelectronic device comprising multiple stacked subcells.

Peumans et al. also does not cure the deficiencies of Forrest et al. as it does not teach or suggest the use of the instant electron-hole recombination zone.

Pettersson et al. also does not cure the deficiencies of Forrest et al. Pettersson et al. does not teach or suggest organic photosensitive optoelectronic devices comprising multiple stacked subcells in series, wherein each adjacent subcell is separated by an electron-hole recombination zone. Rather, Pettersson et al. is directed to a single cell and not a stacked subcell device.

Aratani et al. also does not cure the deficiencies of Forrest et al. Aratani et al. does not teach or suggest organic photosensitive optoelectronic devices comprising multiple

stacked subcells in series, wherein each adjacent subcell is separated by an electron-hole recombination zone. Aratani et al. is directed to a field-effect transistor for use in a liquid crystal display, rather than an organic photosensitive optoelectronic device. Further, Aratani et al. does not teach or suggest the use of an electron-hole recombination zone in an organic photosensitive optoelectronic device.

Lewis also does not cure the deficiencies of Forrest et al. Lewis does not teach or suggest organic photosensitive optoelectronic devices comprising multiple stacked subcells in series, wherein each adjacent subcell is separated by an electron-hole recombination zone and wherein current generated in the first subcell and the current generated in the second subcell differ by less than about 10 %.

Furthermore, Applicants respectfully submit that there is no motivation to combine the cited references in the manner suggested by the Examiner in an attempt to arrive at the present claims. Applicants respectfully submit that the references cited by the Examiner lack the requisite motivation to combine that is needed to satisfy a case of *prima facie* obviousness. It is impermissible within the framework of § 103 to pick and choose from a reference only so much of it as will support a conclusion of obviousness, to the exclusion of other parts necessary to a full appreciation of what the reference fairly suggests to one skilled in the art. *Bausch & Lomb, Inc. v. Barnes-Hind Hydrocurve, Inc.*, 230 U.S.P.Q. 416, 420 (Fed. Cir. 1986). For prior art references to be combined to render obvious a subsequent invention under §103, there must be something in the prior art as a whole which suggests the desirability, and thus the obviousness, of making the combination. *Uniroyal v. Rudkin-Wiley*, 5 U.S.P.Q.2d 1434, 1438 (Fed. Cir. 1988). Hindsight is strictly forbidden. For many of the claims, up to four separate references are combined by the Examiner in an attempt to arrive at the presently claimed invention. The Examiner does not cite to any

specific motivation within the references themselves that would support the combination of those references in the manner proposed by the Examiner. Moreover, many of the references are from different technical fields or are addressing the solution of an unrelated problem. For example, Sato et al. and Hanak et al. are directed to *inorganic* amorphous silicon-based devices rather than *organic* photosensitive optoelectronic devices. Thus, Applicants respectfully submit that there would be no motivation to combine the disclosures of Sato et al. and/or Hanak et al. with the disclosure of Forrest et al. Also, Aratani et al. is directed to a field-effect transistor for use in a liquid crystal display, rather than an organic photosensitive optoelectronic device.

For at least the above reasons, Applicants respectfully submit that the references cited by the Examiner, either alone or in combination, do not teach or suggest each of the limitations of the present claims. Furthermore, there is no motivation to combine the cited references to arrive at the claimed invention. Thus, Applicants respectfully submit that the rejections under 35 U.S.C. §103(a) be withdrawn.

IV. DOUBLE PATENTING

U.S. Patent No. 6,198,091

Applicants respectfully submit that the pending claims are patentably distinct from claims 1-26 of U.S. Patent No. 6,198,091. Each subcell of the stacked devices of claims 1-26 of U.S. Patent No. 6,198,091 requires both a cathode and an anode. The claims of Patent No. 6,198,091 also require that subcells be connected in parallel.

The Examiner notes claim 6 of Patent No. 6,198,091 as teaching "that each of the subcells is selected so that each of the subassemblies will generate substantially the same

voltage when the device is exposed to ambient electromagnetic radiation." However, claim 6 states that the "subassemblies", not subcells, generate substantially the same current. Moreover, claim 6 depends from claim 5, which requires that the subcells are electrically connected in parallel. Thus, the electrical current generated by each subcell is independent from adjacent subcells and no recombination of electrons and holes occurs between the subcells.

The presently claimed devices are distinct from, and un-obvious in view of, the claims of Patent No. 6,198,091. The subcells of claims 1-26 of U.S. Patent No. 6,198,091 are not be separated by the instant electron-hole recombination zone of the present claims. As the pending claims are patentably distinct from claims 1-26 of U.S. Patent No. 6,198,091, Applicants respectfully submit that this rejection should be withdrawn.

U.S. Patent No. 6,198,092

Applicants respectfully submit that the pending claims are patentably distinct from claims 1-27 of U.S. Patent No. 6,198,092. Each subcell of the stacked devices of claims 1-27 of U.S. Patent No. 6,198,092 requires both a cathode and an anode. Further, all of the claims of the Patent No. 6,198,092 are directed to a device in which each subcells is connected in parallel. Thus, the electrical current generated by each subcell is independent and no recombination of electrons and holes occurs between the subcells. The presently claimed devices are distinct from, and un-obvious in view of, the claims of Patent No 6,198,092. The subcells of claims 1-27 of U.S. Patent No. 6,198,092 can not be separated by the instant electron-hole recombination zone of the present claims. As the pending claims are patentably distinct from claims 1-27 of U.S. Patent No. 6,198,092, Applicants respectfully submit that this rejection should be withdrawn.

Application Serial No. 10/822,744

The Examiner has provisionally rejected claims 18-37 on the grounds of nonstatutory obvious-type double patenting as being unpatentable over claims 1-31 of copending Application Serial No. 10/822,744. In support of his position, the Examiner states

> [a]lthough the conflicting claims are not identical, they are not patentably distinct from each other because note in claim 30 of said copending application that the first organic layer (i.e., first subcell) and second organic layer (i.e., second subcell) can contribute the same amount of photocurrent to the device. Office Action of June 29, 2006, page 16.

Applicants respectfully submit that the pending claims are patentably distinct from claims 1-31 of copending Application Serial No. 10/822,744 for at least the following reasons.

Counter to the assertions of the Examiner, the first organic layer of claims 1-31 of Application Serial No. 10/822,744 is a single layer and is a "mixture of an organic acceptor material and an organic donor material." This is distinct from the subcells of the present claims which comprise two layers -- an electron donor layer and an electron acceptor layer. The second organic layer of claims 1-31 of Application Serial No. 10/822,744 is also a single layer and is an unmixed layer of the organic donor material or the organic acceptor material. This is also distinct from the subcells of the present claims which comprise an electron donor layer and an electron acceptor layer. Thus, the claims of Application Serial No. 10/822,744 are not directed to a stacked device comprising multiple subcells. As the pending claims are patentably distinct from claims 1-31 of Application Serial No. 10/822,744, Applicants respectfully submit that this rejection should be withdrawn.

Application Serial No. 10/910,371

The Examiner has provisionally rejected claims 18-37 on the grounds of nonstatutory obvious-type double patenting as being unpatentable over claims 1-32 of copending Application Serial No. 10/910,371. In support of his position, the Examiner states

> [a]lthough the conflicting claims are not identical, they are not patentably distinct from each other because note in claim 7 of said copending application that the first organic layer (i.e., first subcell) and second organic layer (i.e., second subcell) can contribute the same amount of photocurrent to the device. Office Action of December 7, 2005, page 16-17.

Applicants respectfully submit that the pending claims are patentably distinct from claims 1-32 of copending Application Serial No. 10/910,371 for at least the following reasons.

The first organic layer of claims 1-32 of Application Serial No. 10/910,371 is a single layer and is a "mixture of an organic acceptor material and an organic donor material." This is distinct from the subcells of the present claims which comprise two layers -- an electron donor layer and an electron acceptor layer. The second organic layer of claims 1-32 of Application Serial No. 10/910,371 is also a single layer and is an unmixed layer of the organic donor material or the organic acceptor material. This is also distinct from the subcells of the present claims which comprise an electron donor layer and an electron acceptor layer. Thus, the claims of Application Serial No. 10/910,371 are not directed to a stacked device comprising multiple subcells. As the pending claims are patentably distinct from claims 1-32 of Application Serial No. 10/910,371, Applicants respectfully submit that this rejection should be withdrawn.

The Examiner states that "the language 'comprising an electron donor layer and an electron acceptor layer' in the instant claims is so broad that it encompasses the situation in the claims of the '744 and '371 applications where the electron donor and electron acceptor are in the same 'layer', and the situation in the claims of the '371 application where there is a further unmixed layer acceptor or donor material." Applicants respectfully submit that the Examiner is mistaken. The instant claims clearly recite both an electron donor layer and an electron acceptor layer. It is clear by the plain language of the instant claims that at least two layers are thus required for each subcell (an electron donor layer and an electron acceptor layer).

V. CONCLUSION

Applicants respectfully submit that the pending claims are in condition for allowance and request that such action be taken. If for any reason the Examiner believes that prosecution of this application would be advanced by contact with the Applicants' attorney, the Examiner is invited to contact the undersigned at the telephone number below.

Respectfully submitted,
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